1. A. (n.d.). Nine Ways to Catch Kids Up. Retrieved November 01, 2016, from <http://www.ascd.org/publications/educational-leadership/nov07/vol65/num03/Nine-Ways-to-Catch-Kids-Up.aspx>

In the article *Nine Ways to Catch Students Up* , Marilyn Burns shares three essentials when teaching mathematics:

1. Teachers need to help students make connections among mathematical ideas so they do not see these ideas as disconnected facts.

2. Teachers also need to build students’ new understandings on the foundation of their prior learning.

3. Finally it is important for teachers to remember that students’ correct answers are not sufficient for judging mathematical understanding without accompanying explanations of how they reason.

Burns also shares 9 strategies to use to improve mathematical skills and concepts:

1. **Determine and scaffold essential mathematic content**- A teacher must identify concepts and skills that are needed to solve mathematical problems. The content must be organized and taught in a sequential way so students can make the connections and learn. Once induvial skills are taught the students must combine these skills to solve the problem.

2**. Pace lessons carefully-** This idea focuses on unlearning to learn. To do this is it important to pace your lessons to meet students. It is also important that student get ample time to grapple with the skill.

3**. Build in a routine**- To avoid student confusion during independent practice teachers should model during the lesson. Secondly, the teacher re-model with a different problem incorporating student responses. Then the teacher will have students work on similar problem in cooperative learning groups. Finally the teacher will launch off into independent practice which will build a solid routine for students.

4. **Foster student interaction**- Student interaction needs to be part of instruction because giving students a voice and allowing them to express themselves help them internalize the content of the lesson.

5. **Make connection explicit-** the teacher needs to build on prior knowledge and sequential breakdown the process to solve the problem in detail.

6. **Encourage mental calculation**- Student need to have a strong foundation in multiplication because it will foster their mental calculation. Mental calculation will allow students to have a better understanding of the number system and estimation. Mental calculation will help students recognize if their answer make sense or not.

7. **Help students use written calculations to track thinking** – Teach students that paper and pencil are tools to keep track of their thinking. Their thinking should be organized and clearly seen on the paper to show their thinking process when solving a problem.

8. **Provide practice**- Once a teacher models, remodels, and then has students work in groups students need to practice. Students should be provided ample time to practice the skill taught in the lesson Teachers should also be selective about problems that incorporate scaffolded content during independent practice. Games are also a way to engage students and help them lock in content.

9. **Build in vocabulary**- Often times students who struggle have weak math vocabularies. Students need to understand mathematical concepts so they can then can apply the terminology to their understanding. Vocabulary should also be explicitly taught in context to what is being taught in the lesson. Teachers should also use visuals such as anchor charts or word walls within the classroom to reinforce learning.

She then offers insight on intervention and when it should be given. She lists three intervals with both positives and possible negatives that can arise with each approach.

1. **While the Class Is Studying the Topic-** Intervention should be focused on repairing foundational gaps in understanding.

* *Positive*: Intervention during this time may give students the support they need to keep up with the rest of the class.
* *Negatives*: A student may have a serious lack of background that requires reaching back to mathematical concepts taught in previous grades.

1. **Before the Class Studies the Topic-** This method of intervention focuses on preparing a student prior to the lesson being taught so that when you do teach it they are prepared.

* *Positive*: Teachers can prepare students so they can learn withtheir classmates and feel that they can contribute to learning.
* *Negative:* With this method of intervention students are studying two different and math topics at the same time which can be overwhelming.

1. **After the Class Has Studied the Topic-** The last approach provides practice to students after a topic has been taught. This can happen later on during the school day or during summer school.

* *Positives*: Students get a fresh start in a new environment with another instructor.
* *Negative*: Teaching a student after the class can cause the student to be confused while the regular class is being taught.

**Article 2: Mathematics for All Students - PBS. (n.d.). Retrieved October 7, 2016, from http://www-tc.pbs.org/teacherline/courses/math295/pdfs/acf456.pdf**

This article examines the dire changes that are needed in math pedagogy curriculum, policies, and beliefs in order to promote equity in mathematics education for all students in our nation’s schools. In order for a student to grow up and function in society they must be mathematically literate. Equity in math education must be provided for all American students regardless of their race, ethnicity, gender or socioeconomic standing. All students must be provided an equal opportunity to acquire the mathematical skills vital for employment, leadership positions, and social and economic advancement in our ever changing society. Teachers need to apply research based strategies that increase achievement which will enable all students to develop mathematical literacy. Teachers also need to integrate student’s cultural experiences into the learning process to create an environment that all students to interact within.

**Article 3: Education World: Boosting Test Scores: Strategies That Work. (n.d.). Retrieved October 7, 2016, from http://www.educationworld.com/a\_admin/admin/admin366.shtml**

This article shares strategies that have boosted scores among many schools across the nation.

**Analyzing Test Data**- All teachers should be trained to analyze data for student’s strengths and weaknesses. This will allow the teacher to focus instruction on areas of weakness by using new strategies and methods.

**Parent Support Score-Raising Efforts-** It is important to have parent support with school initiatives that help students learn. School should identify students who need the most support and provide them with services during and after school.

**Focusing on “Bubble” Students-** “Bubble students refers to students who are right on the cusp. If they were to get a few more question correct they will be proficient. Once these students are identified they an intervention plan should be created to push them to proficiency.

**Article 4: Why our smartest students are failing math. (n.d.). Retrieved October 8, 2016, from http://www.greatschools.org/gk/articles/why-americas-smartest-students-fail-math/**

This article shows that 60% of college students who enter trying to pursue a STEM (science, technology, engineering, and math) degree drop out. One reason for the large dropout rate is because most students aren’t receive a proper foundation in math which is needed to gain a degree in science, technology, engineering and math. The dropout rate are even higher at the most selective colleges, where students have higher GPA’s in high school. A third of American high school seniors don’t score proficient in math. Richard Rusczyk, a former Math Olympiad winner and the founder of the online math program Art of Problem Solving argues that we are teaching math the wrong way. He shares his thoughts on the current system has students learning by using a set of routine rules however they should learn by using critical thinking and creativity. He believes that students are not pushed to solve problems they have never seen before. His program is geared towards students who are gifted in math but can help benefit all. It starts by giving students a difficult problem with a few leading questions and then once the students have grappled to solve it, give the algorithm. He suggests that students attend math clubs, summer programs and math competitions because they will get experience with more challenging problems that are not taught in the traditional classroom which promotes rote learning. Students with this type of experience are more prepared for the rigor of college math.

**Article 5: 20% of New York State Students Opted Out of Standardized Tests This Year The New York Times. (n.d.). Retrieved October 8, 2016, from** [**http://www.nytimes.com/2015/08/13/nyregion/new-york-state-students-standardized-tests.html**](http://www.nytimes.com/2015/08/13/nyregion/new-york-state-students-standardized-tests.html)

**Also Included: Common Core Test Results - The New York Times. (n.d.). Retrieved October 8, 2016, from http://www.nytimes.com/interactive/2015/08/12/nyregion/13new-york-state-test-results.html**

This New York Times article shares that more students are opting out of taking standardized tests. New York was one of the first states to adopt the new Common Core aligned assessments. When the shift occurred there was a big decline in test scores due to the rigor of the question. Parents argue that their kids are being forced to take an assessment that tests them on skills above their grade level and the sheer amount of testing anxiety it creates has them opting their children out. In 2015 31% of students in New York State scored proficient in reading while 38% scored proficient in math which was an increase from the previous year. Since the number of students opting out it growing it is hard to assess year to year data. School districts are feeling the pressure because Federal law mandates require 95% of students to take the assessment. Some of them are falling below the line and worry that federal funding can be cut. Testing is the only a way to see how districts are measuring up and to hold them accountable. It is also a way to determine where the achievement gap lies so it can be closed. New York City is the leader in the Opt Out Movement which is slowly spreading to other states.

The chart shares data on 3rd-8th grade math and reading results. It supports my theory because it shows a dip in scores from elementary to middle school students.

**Article 6:** **Multiple Intelligences. (n.d.). Retrieved November 01, 2016, from http://www.tecweb.org/styles/gardner.html**

This article is on Howard Gardner’s research on multiple intelligences. Gardner based his 7 multiple intelligences on the way in which people understand the world. Each student learns differently and educators should try to incorporate different styles within our curriculum. The intelligences can be used math to reach all learners.

1. Visual/ Spatial- These students can be taught using charts, graphs, pictures, and models.

2. Bodily/Kinesthetic- These students can be taught by the physical use of manipulatives and real objects.